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THE FAMILY HYDROMETRIDAE IN THE WESTERN HEMISPHERE

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In the naming of aquatic Hemiptera it frequently becomes necessary to test out, if practicable, all the descriptions of species in a given genus in order to be certain of what is before one. This paper had just such an humble beginning. As the work went on, however, it became evident that in order to name certain Cuban species before me so much work had to be done in this and other groups, that this paper shaped itself almost of its own impulse, so to say. The vague and intangible descriptions of the earlier workers called for a careful scrutiny of the various species catalogued. And this checking up in turn called for a complete survey of the group in the Americas and elsewhere, to weigh the validity of characters and consequently of categories.

So it has seemed better to perpetuate this labor, in order to give future workers a foundation on which to commence to build.

Meanwhile, this attempt at evaluation of taxonomic structures in Hydrometra is offered to my fellow-workers with diffidence and with consciousness of its many actual and possible insufficiencies. But since it brings together all that has been written, it will not be without usefulness for reference.

I

In the beginning, in the year 1758, Linneus in the *Systema Naturae*, described in his comprehensive genus *Cimex* the species *stagnorum* in these words:

“stagnorum. 82. *C. linearis nigricans compressus, pedibus anticis brevissimis.....Habitat in Europae aquis pacatis.*”

His successors with more extensive and comprehensive material to work on, broke up the all-inclusive Linnean *Cimex* and set its species in other (and new) genera. Thus, in 1796, Latreille in his *Précis* (p. 86), erected his genus *Hydrometra*. Unfortunately, he could not foresee the future and its rules, so he cites no species under it, although the only species then known to fit his characterization was *C. stagnorum* L. In 1801 Lamarck named *stagnorum* in the genus and under our system of priority, it became *Hydrometra* Lamarck 1801. Here the species rested until 1835, when Burmeister (*Handb.*, II) erected a new genus, *Limnobates*, for the Linnean species. In the meantime, in 1803, Fabricius employed the name *Hydrometra* as coextensive with his own genus *Gerris*, which has led to some confusion. In fact, since 1835 one Continental school has called the genus *Hydrometra*; while the other, the German and its followers, have named it *Limnobates*. The full generic synonymy is set forth by Reuter in *Revisio Synonymica*; by Oshanin in his *Verzeichniss*; and by Van Duzee in his *Catalogue*. The two latter also set forth the full family synonymy; and the last the specific synonymy of the then known North American species to its date.

II

GEOGRAPHICAL DISTRIBUTION

The species of the genus *Hydrometra* heretofore described from the Americas and their islands numbered but 12. Adding to these the 12 herein described as new to science we have a total of 24 species from the Western Hemisphere, outnumbering those described from all the other zoological regions by 12.

The American species may thus be distributed geographically; in order from North to South, in general:

NORTH AMERICA, INCLUDING MEXICO

| | |
|---------------------------------|---------------------|
| <i>Hydrometra australis</i> Say | Southern U. S. |
| <i>H. cordubense</i> Bueno | Mexico (Gulf Coast) |

| | |
|-----------------------------|--------------------------|
| <i>H. cyprina</i> Bueno | Mexico (Gulf Coast) |
| <i>H. martini</i> Kirkaldy | U. S. and Eastern Canada |
| <i>H. hungerfordi</i> Bueno | Kansas |
| <i>H. lillianis</i> Bueno | California |
| <i>H. myrae</i> Bueno | Georgia |
| <i>H. wileyi</i> Hungerford | Texas |

CENTRAL AMERICA

| | |
|---|------------------------------------|
| <i>Hydrometra championiana</i> Bueno | Guatemala, Costa Rica, Colombia |
| <i>H. exilis</i> Bueno | Honduras |
| <i>H. lentipes</i> Champion | Costa Rica |
| <i>H. naiades</i> Kirkaldy | Panamá |
| <i>H. priscillae</i> Bueno | Guatemala |

The two species from the Gulf Coast of Mexico mentioned above will doubtless also be recorded eventually from Central America.

WEST INDIES

| | |
|----------------------------------|-------------|
| <i>Hydrometra caraïba</i> Guérin | Cuba |
| <i>H. championiana</i> Bueno | Cuba |
| <i>H. comata</i> Bueno | Trinidad |
| <i>H. consimilis</i> Barber | Puerto Rico |
| <i>H. gibara</i> Bueno | Cuba |

SOUTH AMERICA

| | |
|-----------------------------------|------------------|
| <i>Hydrometra azenor</i> Kirkaldy | Ecuador |
| <i>H. argentina</i> Berg | Argentine |
| <i>H. championiana</i> Bueno | Colombia, Brazil |
| <i>H. chilensis</i> Reed | Chile |
| <i>H. husseyi</i> Bueno | Paraguay |
| <i>H. kirkaldyana</i> Bueno | Brazil |
| <i>H. mensor</i> B. White | Brazil |
| <i>H. metator</i> B. White | Brazil |

The species of *Hydrometra* in the other faunal regions of the world are thus distributed:

PALAEARCTIC

(7 species)

| | |
|--|--------|
| <i>Hydrometra stagnorum</i> Lin- neus | Europe |
| <i>H. gracilentata</i> Horváth | Europe |

| | |
|---------------------------------|---------------|
| <i>H. procera</i> Horváth | Japan |
| <i>H. lineata</i> Eschscholtz | China, Japan |
| <i>H. greeni</i> Kirkaldy | India, Ceylon |
| <i>H. albolineata</i> Scott | Japan |
| <i>H. eremopia</i> Kiritschenko | Transcaspia |

AFRICA

(2 species)

| | |
|---|--------------|
| <i>Hydrometra albolineolata</i> Reuter | Guinea, Boma |
| <i>H. ambulator</i> Stål | Caffraria |

AUSTRALIA, ETC.

(3 species)

| | |
|---|---------------|
| <i>Hydrometra aculeata</i> Mon- trouzier | New Caledonia |
| <i>H. papuana</i> Kirkaldy | New Guinea |
| <i>H. strigosa</i> Skuse | Australia |

On this distribution, as at present known, the family is predominantly neogeic—in fact, Neotropical;—one might almost say that the center of dispersal lies in the Caribbean Islands and littoral, about which half of the 24 known American species cluster, radiating therefrom north and south into the continental masses and west into Central America, in gradually decreasing numbers as the distance north and south from the center increases. For example, north of the Gulf of Mexico, only 6 American species are known; and South of the Amazon River only three others; while from the Caribbean countries and islands 12 species are registered. In further support of this hypothesis is cited the new genus and species *Limnobotodes paradoxus*, from Honduras, discovered by Hussey. Of course, this may indicate nothing more than that these forms have been more collected in the New World than elsewhere. But consider for instance the distribution of *Rhagovelia*, a well-known and thoroughly collected genus; or of *Microvelia*, an assemblage of minute and easily unnoted species, both of which are predominantly American. It thus seems unlikely that *Hydrometra* should have eluded capture or escaped observation, particularly since it haunts the same habitats as *Microvelia*. Until further evidence to upset this view presents itself it would seem we may well accept the foregoing as a tenable working hypothesis.

III

BIOLOGY

Habits

The habits of *Hydrometra* by this time have been well examined into. This genus of linear forms walks and runs about in marshes or marshy places, as its Burmeisterian name, *Limnobates*, implies. But it also stalks its prey in shallows along the rush-grown borders of ponds and other small calm bodies of water, in whose sun-warmed depths (or shallows) vast numbers of Entomostraca and other plankton furnish an abundance of food to their roving, seeking stylets. The rushes rising tall from the water afford them a foothold and a refuge, as well as a place to lay their eggs. Our knowledge, thoroughly tested and checked, is the result of the observations of Mina Palumbò, Brocher, Kirkaldy, Martin, Hungerford, and myself.

Life History

Their life-histories, both here and abroad, have been studied by the same men. The long, spindle-shaped eggs with a sculptured chorion—eggs seemingly too large for so exiguous an insect—are attached by one end to the rush stems, a short distance above the water. Our *Hydrometra martini* deposits say 175 eggs in a season, and possibly more. These eggs hatch out in anything from 4 to 20 days, but in warm summer weather, on the average in 7 days. After 5 moults, taking say 10 days, the adult insect emerges to the active affairs of life—namely, the propagation of the species. There is thus opportunity for 2 or 3 or more broods a summer.

In cold latitudes, *Hydrometra* hibernates in the adult. About White Plains, N. Y., *H. martini* may be secured as early as the middle of March, practically as soon as the ponds are ice free. At such times, the shallow water at the edges is tepid in the warming sun of early spring; and teems with plankton, principally *Daphnia*, *Cypris* and *Cyclops*.

Hydrometras are easily kept in captivity and breed in aquaria, thriving on a diet of flies and other small, soft-bodied insects. They are, therefore, ideal for observation.

Pterygopolymorphism

Some—a very small minority—of the adults have fully developed wings, capable of use. *Hydrometra mentor* B. White was captured at light, for instance. But the vast majority are either apterous or brachypterous, in some instances bearing only tiny vestigial wings peeping out from under the posterior edge of the much diminished pronotum; in others, narrow, strap-like microptera extending along the metathorax; or, in fine, short wings increasingly long until it becomes impossible to draw a line between the fully developed wing and the undeveloped. And this is particularly true because the fully developed *do not* reach the abdominal apex in any instance.

An examination of a series of *H. championiana* from a homogeneous locality—Los Amates and Gualán, in Guatemala—gave 9 long-winged, but the apex of the wings does not quite attain the anterior margin of the 5th abdominal segment. In the 31 micropterous (there are no fully apterous in the lot), the narrow, strap-like hemielytra reach as far as the hind acetabula.

In *H. martini* there is true microptery, the wings appearing just under the edge of the prothorax as two minute, scale-like tabs, scarcely to be seen except under a high power. In the winged the hemielytra reach only to the middle, or just beyond, of the 4th abdominal segment. Of some hundreds examined, barely a half-dozen were totally apterous. The long-winged are also comparatively very rare. It may then be assumed that this much reduced microptery represents the normal form in this species, the totally apterous and the long-winged being extremes attained at times. No deduction of any value may be made by counting the fully winged in any aggregate of specimens of *martini*, or of any other species, since the apterous or short-winged are rejected in numbers by collectors, while the long-winged, being great rarities, are very sedulously sought for and kept.

Poisson¹ in his recent studies examined the variation of wing-length in *H. stagnorum* (pp. 261–62) and noted the conditions under which it varied. He found that descendants of micropterous were micropterous, and of macropterous, macropterous. Where the

¹ Contributions a l'Étude des Hémiptères Aquatiques, 1924, Bull. Biol. Fr. et Belg., LVIII, fac. 1, pp. 49/305, pls. I–XIII.

micropterous parents had wings each of the same length as the other, all the progeny resembled the parents in microptery, but a few had shorter and a larger number longer wings; but where there was inequality of wing-length in the parents, there was a slight oscillation in the progeny about the wing-lengths of the parents. He did not succeed in mating macropterous with micropterous. From these tests, he concludes that microptery is hereditary and pure when the parents are of equal wing-lengths (p. 264).

IV

ALPHABETICAL LIST OF NEOGEIC SPECIES OF HYDROMETRA

- | | |
|---------------------------------|--|
| 1. <i>H. agenor</i> Kirkaldy | Ecuador |
| 2. <i>H. argentina</i> Berg | Argentine |
| 3. <i>H. australis</i> Say | Southern U. S. |
| 4. <i>H. caraiba</i> Guérin | Cuba |
| 5. <i>H. championiana</i> Bueno | Cuba, Central America, Panamá, Colombia, Brazil |
| 6. <i>H. chilensis</i> Reed | Chile |
| 7. <i>H. comata</i> Bueno | Trinidad, W. I. |
| 8. <i>H. consimilis</i> Barber | Puerto Rico, Cuba |
| 9. <i>H. cordubense</i> Bueno | Mexico (Gulf Coast) |
| 10. <i>H. cyprina</i> Bueno | Mexico (Gulf Coast) |
| 11. <i>H. exilis</i> Bueno | Honduras |
| 12. <i>H. gibara</i> Bueno | Cuba |
| 13. <i>H. hungerfordi</i> Bueno | Western U. S. (Kansas) |
| 14. <i>H. husseyi</i> Bueno | Paraguay |
| 15. <i>H. kirkaldyana</i> Bueno | Brazil |
| 16. <i>H. lentipes</i> Champion | Costa Rica |
| 17. <i>H. lillianis</i> Bueno | Western U. S. (California) |
| 18. <i>H. martini</i> Kirkaldy | Eastern U. S., Canada |
| 19. <i>H. mentor</i> B. White | Brazil |
| 20. <i>H. metator</i> B. White | Brazil |
| 21. <i>H. myrae</i> Bueno | Georgia |
| 22. <i>H. naiades</i> Kirkaldy | Panamá |
| 23. <i>H. priscillae</i> Bueno | Guatemala |
| 24. <i>H. wileyi</i> Hungerford | Arizona |

V

SYSTEMATIC LIST OF NEOGEIC HYDROMETRAE

A structural study of *Hydrometra* indicates that the primary divisional characters for grouping are:

1. The proportion of the anteoocular to the postocular part of the head;

2. The proportion of the antennal segments *inter se*;
3. The presence or absence of pitting on the pronotum, pleura and acetabula;
4. The presence or absence of the male abdominal processes, and their form and structure.

Of these characters, the only one heretofore used by describers with a fair degree of constancy is the proportions of the parts of the head; the only American form in which this character has not been given is in *Hydrometra chilensis* Reed. The proportional ratios of the segments of the antennae to each other have also been employed to some extent, but in a rather vague manner. Horváth first employed the processes on the 6th male ventral segment, which were used subsequently by Martin, Barber and Hungerford. And finally, the thoracic pittings were first employed by Hungerford, being seemingly overlooked by all other authors to whose writings I have had access.

The proportions of the head segments may vary from equality *inter se* to an observed proportion of nearly three to one. For convenience, arbitrary limits of length of the anteocular part of less than twice, twice, $2\frac{1}{2}$ times and more than $2\frac{1}{2}$ times the post-ocular part. This gives 4 possible tangible variations, not likely to run one into the other in a given species, on the average.

The variation of the proportions of the antennal segments each one to the others is much wider, and they may be combined in a number of ways. In passing, it may be noted that segment III is always the longest and segment I generally the shortest; the others are more variable. Study of *Hydrometra championiana* seems to indicate a certain degree of variability within the species, not only absolutely, but also relatively.

The pittings are of five types:

- a. Absent or present on the anterior lobe of the pronotum;
- b. Absent or present on the posterior lobe of the pronotum;
- c. Absent or present on the pleura;
- d. Absent or present on all three acetabula;
- e. Absent on one acetabulum, the third.

In this sorting out alone, there are nine possible distinctions between species, without taking into account whether the pits are

many or few, large or small, evident or evanescent; or whether the acetabula are dull or polished. This single group of characters is sufficient to separate over 30 species. Unfortunately, in the descriptions of the species unknown to me in nature it is not mentioned; these species are *H. agenor*, *H. argentina*, *H. caraiba*, *H. chilensis*, *H. mensor* and *H. metator*.

The male abdominal processes of the 6th ventral segment are also positive characters, but they show only four changes in form, as below:

- a. Processes absent;
- b. Lateral tumefactions;
- c. Processes linear, of varying widths and angular set on the segment;
- d. Processes more or less acuminate or spinose, not linear.

In this group of characters there is the possibility of *at least* four differentiations, although at least six may be safely employed.

Without taking into consideration the antennae, which are seemingly less stable than the other characters mentioned above, the other three series of characters may be combined in 320 different ways, more than enough to distinguish ten times as many Hydrometras as are known from all over the world at this present moment.

The fundamental grouping of the species would seem to be primarily based on the male ventral processes and on the character of the acetabula and their pits. These characters, unfortunately, are not known for the species described before 1899 for the former, nor for the species described before 1923 for the latter; and in the absence of specimens, particularly of males, it has not been possible to use them throughout.

Size is a fairly constant character within species, although the females are usually much larger than the males. The mean size of the species seems to be about 10 mm., ranging from 8½ to 11½ mm. One group varies between 13½ to 16 mm., and another exceeds 17 mm., the latter comprising two species whose only structural characters given in the descriptions are the proportion of the head sec-

tions and the length. The character of the extension of the rostrum is at times difficult to delimit satisfactorily, as this structure is flexible and is frequently found curved into an arc difficult to measure, instead of lying straight, appressed to the under part of the head.

Preliminary Systematic Arrangement of the Species of Hydrometra

Anteocular part of head much less than twice the length of the postocular.

H. mentor B. White.

Anteocular part slightly more or less than twice the postocular.

No thoracic pits.

H. kirkaldyana Bueno.

Thoracic pits.

Male processes acuminate, blunt or sharp.

H. cyprina Bueno.

H. consimilis Barber.

H. hungerfordi Bueno.

H. lillianis Bueno.

H. wileyi Hungerford.

Male processes linear.

H. martini Kirkaldy.

H. myrae Bueno.

H. husseyi Bueno.

Male processes not known.

H. naiades Kirkaldy.

H. caraiba Guérin.

H. metator B. White.

Anteocular part of head more than twice the postocular.

No thoracic pits.

Male processes acuminate.

H. comata Bueno.

Thoracic pits.

Male processes acuminate.

H. australis Say.

H. gibara Bueno.

H. exilis Bueno.

Male processes linear.

H. championiana Bueno.

Male processes absent or represented by tumefactions.

H. cordubense Bueno.

H. lentipes Champion.

H. priscillae Bueno.

Male processes not known.

H. agenor Kirkaldy.

Two of the described species are omitted—*H. argentina* Berg and *H. chilensis* Reed. The unfortunate absence of structures in the descriptions of these prevents placing them in their proper groups, even approximately.

Discussion of Species Represented

The arrangement of the species is in accordance with the systematic list preceding. Paucity of fixed structural details in the original (and in most cases, only) description, makes difficult this sorting out. As it is, two species are left in the air: namely, *Hydrometra argentina* Berg and *H. chilensis* Reed. No specimens from these countries are at hand; and it becomes impossible to fix the species, even approximately, because of the absence of structural characters in the original description. Buchanan White's species—*H. mentor* and *H. metator*—are in scarcely better case; fortunately, in these two, as in *H. caraiba* Guér., the head proportions and size are given, which permits their inclusion in the major divisions. *H. martini* Kirk. (= *lineata* Say) is quite recognizable from the original description; and moreover, it has been quite well characterized by subsequent writers, who are agreed on the species. This is not quite true of *H. australis* Say. The next author to describe American Hydrometras is Champion, in *Biologia Centrali Americana*. His work is a distinct advance on that of his predecessors, although he seems not to have recognized Buchanan White's species, nor Guérin's, for which he is scarcely to be blamed. The first really satisfactory description of a *Hydrometra* is Barber's *consimilis*. Later, Hungerford described *H. wileyi*, restudied *martini*, and examined the form he calls *australis*.

This diversity of method, and in early descriptions, inadequacy, has led to a study of the characters employed and to their evaluation as fixed specific criteria. In *Hydrometra*, as in *Microvelia*, we are at the outset confronted with the phenomenon of pterygopolymorphism, which at once does away with the form and structure of the thorax as specific characters; it even to some extent modifies the pitting on the posterior prothoracic lobe.

While many obvious characters are omitted in these new descriptions, the 10 characters employed are capable, (as shown by the algebraic formula for combinations), of at least 400 combinations, no two alike, if taken two at a time; of 3,340 combinations if taken 3 at a time. Since there are at the moment only 24 species of

Hydrometra known from the Americas (doubtless soon to be increased by the enthusiastic labors of my friends who read this), it is still possible to employ no more characters than these, and still differentiate at least 3,300 more species.

As mentioned before, a number of other characters have not been used either in these descriptions or in the key. The head, for instance, has six slender long setae in pairs, two in front, back of the antennae, two just in front of the eyes, and two in front of the anterior margin of the pronotum. These are set in pits, sometimes showing darker than the surrounding hue of the head. Their delicacy makes them plain only under high powers, on the one hand; and on the other they are at times seemingly rubbed off. Hence, they have not been employed. The proportions of the rostral joints are also unused, owing to the difficulty of seeing them, and also of measuring the curved third joint. The proportions of the legs and their joints to each other and of the joints *inter se* are quite excellent, but are scarcely needed in view of the multiplicity of other characters. The form of the thorax and the shape of its sclerites are variable, owing to polymorphism, as already pointed out; and while useful as between the fully winged forms of species, they are untenable as a universal character for all forms. The abdomen shows positive characters, although some of these are difficult to see even under high powers, as for example, the spiracles and their position in the segments, which varies with the species. The comparative length of its segments, the abdominal keel or stripe, and the structure of the connexivum are also available.

It may here be remarked that the exactness possible to the binocular microscope with an eyepiece micrometer, at magnifications from $\times 20$ up makes possible refined measurements unattainable with the hand lens, even at high powers. This tends to make descriptive entomology a matter for technical experts with suitable equipment. It may possibly be urged that too much stress is laid on numerical ratios. While this objection must be noted, it may also be pointed out that numbers and ratios are positive factors and not guesswork, for comparatives, (for example, "stouter"), simply reflect an opinion; or again, "3 punctures" is more definite than "several punctures," which may mean anything from 3 up. In general, technical descriptions are not meant for universalist entomologists who dip into selected groups here and there; and who, of course, lacking the corrective influence of extensive acquaintance with family limitations in characters, describe in haste "N. Sp." on

insufficient grounds. It is perhaps as well to erect a barrier against such casuals, who rush into print with descriptions of single specimens in sweet innocence of the group to which they belong. To us who have the ungrateful task of unravelling their snarls, anything that tends to eliminate them is welcome.

Comparative measurements of structures unfortunately provide no natural law against teratology. Hemipterists have been known to erect genera on species with four antennal joints, from specimens in which the terminal segment in each antenna had been broken off. Or again, we might argue that the number of joints of the antennae was an invalid character, because at times we run across teratological individuals in which, because of accident, two joints have become fused into one.

"Know how" is as necessary in the use and limitations of structural characters as it is in plumbing.

VI

TECHNIQUE OF DESCRIPTIONS

All these descriptions are drawn up at a magnification of 20, under the binocular microscope. Where a higher magnification may have been used to see clearly any structure, it is so stated. All measurements and proportions are by eyepiece micrometer, at a fixed standard of 20 divisions to the millimeter. Hence, to find the dimensions of any structure, divide the unitary proportions by 20.

The length of curves, that is, of true arcs, may be ascertained by a simple device. The distance between the ends of the arc, that is, the length of the chord, is found; and to this length add $\frac{2}{3}$ of the perpendicular from the chord to the arc at its highest point. For example, a rostrum on a curve measures from end to end of the curve 5 mm.; the perpendicular from the chord to the arc is 2 mm.; therefore, the length if the curve were straightened out would be 5 mm. + $\frac{2}{3}$ of 2 mm. = 6.33 mm. This is sufficiently close for all practical purposes and is used in engineering practice for rough figuring.

As to the descriptions themselves, these are on a uniform plan throughout on material in hand; and all can be compared directly, structure for structure. They are not, nor do they purport to be, complete descriptions of a single specimen—the type; they are rather generalized for all the specimens studied in each species. In some sort, they are cognate to the skeletal and dentitional for-

mulae used in differentiating mammalia, adapted to the exoskeletal structures of insects.

Perhaps this particular form of differentiating species may not be applicable to all groups in the characteristics employed in this one, but certainly where critical structural characters of a group have been developed, these may well be formulated in some such form. Such descriptions will always have the advantage of brevity and particularly of concreteness and definiteness, since all vague comparatives and judgments are discarded.

VII

CHARACTERIZATION OF HIGHER GROUPS OF HYDROMETRIDAE

The description of a new genus by Hussey (see *Bulletin Brooklyn Ent. Soc.*, XX: 115) calls for a recharacterization of the family. The number of antennal joints ceases to be a family character; the size and position of the claws likewise must be rejected for this purpose; the linear body appears to be only a generic character, as also the length of wings as compared to the abdomen and the length of the rostrum. The new definition of the family is as follows:

Family *Hydrometridae*

Billberg, 1820, Enum. Ins. Mus. Billb., p. 67.

Head longer than thorax, with two or three pairs of setae above; eyes agglomerate, large, round, remote from the anterior margin of the prothorax; ocelli absent; front greatly produced; antenniferous tubercles lateral, antennae filiform; rostrum 3-segmented, segment II longest, basal segment concealed between the prominent bucculae; legs very slender, all fit for walking; tarsi 3-segmented; abdomen with 6 segments, not counting the genital; hemielytra semimembranous, not divided into areas; scutellum present in winged; stink orifices present but rudimentary.²

In the publication cited, Dr. Hussey has described his new genus *Limnobotodes*, in view of which a redefinition of the genus *Hydrometra* seems to be desirable—in fact, necessary. This, very briefly but possibly more extensively than heretofore, follows.

² I am indebted to Dr. R. F. Hussey for pointing this character out to me.

Genus *Hydrometra* Lamarek

1801, Syst. An. sans Vertebr., p. 295.

Antennae four-segmented, segment III longest, I shortest; body very slender, almost linear, at least ten times as long as wide; wings when present normally shorter than the abdomen; head setae in three pairs, two pairs on the anterior swollen part of the head and one pair a very short distance in front of the anterior margin of the pronotum, set in pits; rostrum not passing anterior margin of pronotum; pronotum much longer than wide; omphalium absent; tarsal claws apical, set close together.

Genus *Limnobotodes* Hussey

1925 Bull. B. E. S. XX: 115.

Antennae 5-segmented, segment V longest, II and IV shortest; body stoutish, not more than six times as long as wide; wings when present nearly reaching the apex of the abdomen; head setae in two pairs, one pair on the anterior swollen part of the head and one pair just in front of the anterior margin of the pronotum, set in non-pigmented areas; rostrum reaching middle of coxae; pronotum about as broad as long; omphalium present; tarsal claws subapical, minute, inserted dorsally.

Key to Genera of HYDROMETRIDAE

- Antennae 4-segmented, segment III longest; rostrum not passing anterior margin of prosternum; claws apical; head setae 6, paired, two pairs anteriorly; omphalium absent; tylus not narrowed basally.....HYDROMETRA Lam.
- Antennae 5-segmented, segment V longest; rostrum reaching intermediate coxae; claws subapical, extremely minute; head setae 4, paired, one pair anteriorly; omphalium present; tylus narrowed basally, truncate.....LIMNOBATODES HUSS.

Hem Singh-Pruthi, in his just published paper,³ states that in view of his studies of *H. stagnorum*, "The genitalia in Hydrometridae are not so different from those in Gerridae, etc., to warrant its being elevated to the rank of a distinct family; much less is it justifiable to raise it to a distinct phalanx, Hydrometriformes, as is done by Reuter and Oshanin" (p. 178). At the outset, it may be said that Oshanin merely accepted and followed Reuter. Now,

³ The Morphology of the Male Genitalia in Rhynehota. Tr. Ent. Soc. Lond., 1925, pts. I and II, pp. 127-267, pls. VI-XXXII.

Reuter made this disposition of the family on other grounds than the genitalia pure and simple, these being in the Gerridae the presence of an omphalium, the claws aroliate if terminal, and the longer posterior legs than the anterior; and in the Hydrometridae, the absence of an omphalium, the absence of arolia in the apical claws and the slender legs. But, Hussey's finding of an omphalium in *Limnobotodes*, which has subapical claws, leaves the respective lengths of the anterior and posterior legs as the only differential criteria, which seem slight enough. However, the head structure and the agglomerate eyes would seem to be additional characters for maintaining the separate identity of the two families. It can not, nevertheless, be denied that they are closely related. In my own concept based on the structure of the egg and other structural considerations it would seem that this family, as well as the Gerridae, Reduviidae and Nabidae, are all offshoots from one primitive parent stem, whatever we may for convenience call it; and more or less related, not as links in a chain, however, but as tips of twigs, distant from the parent stem.

These relationships call for a more careful and correlated study of *all* the characters, not merely of the genitalia or the egg, or the claws, but of every structure; and of the entire embryology and development. We may, when this is done, then pronounce.

VIII

DIFFERENTIATION OF SPECIES

Here, as in other groups of aquatic Hemiptera, we have to deal with extraordinarily terse primary descriptions—so terse, indeed, as to be generalized for any number of species of the same size. And here again, we have color and pattern predominating as specific criteria, with a correspondingly great absence of structural details, except here and there, until we come to Douglas and Scott in 1865. In these conditions, abundance of controlled material is necessary to reliably elucidate species. The subjoined key to the described American Hydrometrae is tentative only; and is offered for the purpose of coming to some agreement and delimiting the older species. It is accurate according to our present knowledge as derived from the species so far controlled themselves for some; and from the extremely synoptic, not to say cryptic literature for the others.

Hence, this key is far from complete or satisfactory, because of the species included in it which are unknown to me in nature and

for which the original descriptions afford a minimum of structural characters. Such species are *H. mensor* B. White, *caraiba* Guérin, *metator* B. White and *agenor* Kirkaldy. Two species had to be omitted altogether because of the practically complete absence of structural characters, except the size; of these two, *argentina* Berg has the proportional length of the anteoocular and postocular parts of the head given which serves to place it in a general group but no more; the sole fixed character given for *chilensis* Reed is its length.

In *caraiba* Guérin the anteoocular and postocular proportions are given together with the length; the latter in itself is enough to mark the species as the largest known in the genus. Further, a direct comparison is made with *stagnorum* Linné, from which comparison the antennal proportions mentioned in the key are arrived at. *H. metator* B. White is also larger than any of the others. So these sizes have been employed as a primary division. *H. mensor* B. White stands alone in having the anteoocular part of the head less than $1\frac{1}{2}$ times as long as the postocular.

The primary critical characters used in this key are: (1) proportion of the anteoocular part of the head to the postocular; (2) length of rostrum as compared to the head, which is expressed in terms of its extension posteriorly to or beyond the eyes; (3) proportions of the antennal segments, particularly between I and II, and II and IV; (4) thoracic and acetabular pittings, their absence or presence and character; (5) form of the clypeus; (6) proportional distance of the coxae *inter se*; (7) extension of the anterior and posterior femora as compared to the head and the apex of the abdomen respectively; (8) comparative length of the head and antennal segment II; (9) male ventral processes of the 6th segment of the abdomen; (10) terminal segment of male abdomen; (11) length.

These eleven structural characters and their variations have been employed because they appear to be stable and invariable for all forms of the species. The proportions of the segments of the head are thus measured: *anteoocular* from the very tip of the clypeus to the anterior margin of the eyes; *postocular*, from the posterior margin of the eyes to the anterior margin of the pronotum, *with the head in natural position*—if the head is bent down it will be longer and if up, shorter. The length of the rostrum has been sparingly employed, since this appendage appears to be very flexible and is frequently found in quite a distinct arc of circle; its use here, however, is such that even under such a condition it may be depended upon with a fair degree of certainty. In the propor-

tions of the antennal segments, III is omitted, for this, likewise, is likely to be curved, sometimes in more than one plane; segment IV also may be slightly curved, or even sinuate, or absent, hence is sparingly used; segments I and II are stouter and stiffer than the others and always straight. The pronotal and acetabular pittings explain themselves; and so does the form of the clypeus. The distances between the coxae are more properly the distance from the anterior part of each acetabulum to the anterior part of the one behind; if the coxae proper were used, this would not be a fixed quantity, since the position of the legs alters the position of the coxae and hence the distance between them. The extension of the apices of the anterior and posterior femora is evident. The male abdominal processes are excellent characters; these may be absent or present; if present they may be conical or linear. Lack of males of some of the species and the absence of mention of this character in descriptions has prevented the adequate use of this excellent differential structure. The terminal segments and the length require no explanation. The former have not been used as much as might be because of the difficulty of putting them into words in such a manner as to bring out differences of outline and structure unequivocally.

There are other characters and refinements which appear in the descriptions not used in this key; still other characters have been omitted altogether in both key and descriptions, because of their instability, such for instance, as the hemielytra, or the shape of the thorax, or the six head setae. The endeavor has been to make this key both practical and accurate. Beyond the first three couplets (which are based on deficient descriptions), it should be nearly free from the possibility of misinterpretation.

It may seem that too much reliance is placed on dimensions and proportions—that is, on numbers. But numbers are among the few things one mind may convey to another intact and exact, without room for play of imagination or exercise of judgment; numbers are in themselves positive; in regard of one number to another, absolute.

Thus, anyone exercising ordinary care and with the proper equipment should be able to use this key very readily and very accurately.

KEY TO THE KNOWN SPECIES OF NEOGEOIC HYDROMETRAE

- 1—Anteocular part of head nearly $1\frac{1}{2}$ times as long as postocular; length, $12\frac{1}{2}$ mm. *mentor* B. White

- Anteocular part of head much more than $1\frac{1}{2}$ times post-ocular 2
- 2—Length of species over 17 mm.; ao much more than twice po⁴ 3
 Length of species less than 17 mm. 4
- 3—Antennal segment IV twice segment I; antennae as long as body; length, 18 mm., width, 1 mm. *metator* B. White
 Antennal segment IV nearly three times as long as I; antennae not as long as body; length, 22 mm., width, 1 mm. *caraiba* Guérin
- 4—Ao twice or slightly more or less than twice po 5
 Ao notably more than twice po 14
- 5—Posterior lobe of pronotum more or less pitted; acetabula more or less pitted 6
 Neither pronotum nor acetabula pitted; (antennal formula I: II: IV?: III; rostrum extending beyond eyes by $\frac{1}{2}$ po; length, 11 mm.) *kirkaldyana* n. sp.
- 6—Clypeus large, broad and truncate 7
 Clypeus small, narrow and conical 9
- 7—Rostrum extending more than $\frac{1}{2}$ po beyond eyes; mid coxae $1\frac{1}{2}$ times as far from posterior as from anterior 8
 Rostrum extending to $\frac{1}{2}$ po; mid coxae twice as far from posterior as from anterior; (antennal segment II about $1\frac{1}{2}$ times segment I; posterior femora in male passing apex of abdomen, in female not quite reaching 6th abdominal segment; male abdominal processes acuminate; length, male, $13\frac{1}{2}$ mm., female, 15 mm.) *wileyi* Hungerford
- 8—Rostrum extending $\frac{3}{5}$ po beyond eyes; segment II of antennae about $1\frac{1}{3}$ times segment I; male posterior femora just reaching tip of abdomen, female not quite reaching middle of 6th segment; male abdominal processes mammilose, blunt, widely separated; length, male, 9 mm., females, 11.35–11.8 mm. *lillianis* n. sp.
 Rostrum extending $\frac{3}{4}$ po beyond eyes; segment II of antennae $1\frac{2}{3}$ times segment I; male posterior femora barely passing apex of abdomen; male abdominal processes spinose, curved backward; length, 11 mm. *cyprina* n. sp.
- 9—No pronotal punctures; (antennal formula I: II: IV: III; 4th segment of antennae about 3 times as long as I; male pro-

⁴ To save space, throughout this key *ao* will stand for "anteocular part" and *po* for "postocular part."

esses spinose, glabrous, very minute and close to anterior edge of abdominal segment; length, male, 9 mm.)

hungerfordi n. sp.

- Pronotal punctures or pits10
- 10—All acetabula punctured or pitted; antennal segment II about three times as long as I; (rostrum extending $\frac{2}{3}$ po beyond eyes; antennal segments II and IV equal; antennal formula I: II & IV: III; posterior coxae twice as far from middle as middle from anterior; length, females, $9\frac{1}{2}$ –11.25 mm.)
naiades Kirkaldy
- Two anterior acetabula pitted; antennal segment II twice as long as I11
- 11—Two pits only on each acetabulum, one on each side of the cleft; head about, or less than, three times as long as segment II of antennae12
- Four pits on each acetabulum, two on each side of the cleft; head more than three times as long as segment II of antennae: (antennal formula, I: IV & II: III; segment II twice as long as I; rostrum extending more than $\frac{1}{2}$ po beyond eyes; length, female, 9.5 mm.)*consimilis* Barber
- 12—Rostrum extending about $\frac{2}{3}$ po beyond eyes; segment IV of antennae about $1\frac{1}{2}$ times as long as II; length, 8.5–9.75 mm.*martini* Kirkaldy
- Rostrum reaching or only slightly passing middle of po; segment IV of antennae subequal to or slightly longer than II13
- 13—Male abdominal processes linear; pronotal pits minute, scattered; mean antennal proportions 8: 20: 45 \pm : 22; length, male, 8.75–9.75 mm., female, 10.55–11.25 mm.*myrae* n. sp.
- Male abdominal processes spinose, long, slender, pronotal pits large, very shallow, irregularly scattered, more like depressions; antennal proportions 8: 18: 42: 19; length, male, 10.05 mm., female, 11.7–12.35 mm.*husseyi* n. sp.
- 14—Ao not $2\frac{1}{2}$ times as long as po15
- Ao more than $2\frac{1}{2}$ times as long as po18
- 15—Ao more than four times as long as antennal segment I16
- Ao less than four times as long as antennal segment I17
- 16—Antennal segment II nearly twice ($1\frac{1}{3}$ times) as long as I; length, $13\frac{1}{2}$ mm.*agenor* Kirkaldy
- Antennal segment II more than twice as long as I; (antennal segment III over five times as long as I; a few scattered punctures on two anterior acetabula); length, 10.6 mm.
australis Say

- 17—Pronotum and acetabula without punctures or pits; rostrum extending $\frac{3}{4}$ po beyond eyes; clypeus broad, medianly excised; male abdominal processes spinose; length, 11.15 mm.
comata n. sp.
 Pronotum and acetabula deeply pitted; rostrum just passing eyes; clypeus narrow, pointed; male abdominal processes entirely absent; length, male, 10.25 mm., female, 11.35 mm.
lentipes Champion
- 18—All three acetabula pitted19
 Two anterior acetabula slightly pitted; (male processes acuminate, near anterior edge of segment; rostrum extending $\frac{1}{2}$ of po beyond eyes; male anterior femora passing apex of head; antennal segment II less than twice as long as antennal segment I; length, 11 mm.)*gibara* n. sp.
- 19—Male processes linear, mere swellings, or absent20
 Male processes acuminate or spinose*exilis* n. sp.
- 20—Male processes entirely absent, nor any abdominal tumescence; ao only slightly more than twice as long as po; (rostrum not extending beyond eyes; antennal segment IV three times as long as antennal segment I; length, male, 9.1–9.35 mm., female, 11 mm.)*cordubense* n. sp.
 Male processes linear or tumescences; ao at least $2\frac{1}{2}$ times po21
- 21—Ao $2\frac{1}{2}$ times po; clypeus narrow, acuminate; male anterior femora not reaching antennal tubercles; male abdominal processes reduced to lateral tumescences; male genital segment cylindrical, apical process very short; length, male, 13.5 mm.*priscillae* n. sp.
 Ao nearly three times as long as po; clypeus as broad as long, bluntly acuminate; anterior femora passing apex of head; male abdominal processes broadly linear, crescentic, converging anteriorly toward median line of segment and equidistant from anterior and posterior margins, black and hairy; male segment more or less sinuate laterally as seen from above, apical process sharp; length, male, $13\frac{1}{2}$ mm., female, 15.25–16.5 mm.*championiana* n. n.
 (= *caraiba* Champion, nec Guérin)

IX

CHARACTERIZATION OF SPECIES

Hydrometra mentor F. Buchanan White, 1879, Trans. Ent. Soc. Lond., 267, (nec Champion, 1898, Biol. C.-Am. Hem.-Het. II: 124–5; nec Kirkaldy, 1909, Can. Ent. XLI: 389).

Anteocular part of head $1\frac{1}{2}$ times as long as postocular; length of insect $11\frac{1}{2}$ – $12\frac{1}{2}$ mm.

The original description reads as follows:

“Testaceo-brunnea, oculis rufo brunneis, tibiis ad apicem tarsisque fusco-brunneis. Capite parte anteoculari parte postoculare fere $1\frac{1}{2}$ longiore; pronoto ante marginem posticum tuberculis 2 subelongatis instructo; hemelytris dimidio abdominis tangentibus. Male, Long. $11\frac{1}{2}$ – $12\frac{1}{2}$ mm. Hab.—Manaos (August, 1875). Two specimens “at light,” on board the steamer. The much smaller size will at once distinguish this from *H. metator*.”

This species has been misidentified both by Champion in *Biologia* and by Kirkaldy in *Canadian Entomologist* and in his *Entomologist* paper hereafter named. The last paper drew attention to this first mentioned fact, and for the species seen by Champion proposed the new name *naiades* (q. v.). The sole character White gives, the anteocular part of the head “nearly $1\frac{1}{2}$ times as long as the postocular,” cuts it off sharply from all the other American species of the genus, in which the proportion is at least two to one. The only other structural character given by White is the length of the insect, which puts it in the *martini* group.

It is regrettable that there is no authentic material in hand of this species and of *metator* B. W. and *caraiba* Guérin, since they must therefore perforce remain uncertain until such a time as more extensive collections and ampler series of material will ensure their elucidation.

Hydrometra kirkaldyana n. sp.

(= *H. mensor* Kirkaldy, 1909, *Can. Ent.* XLI: 389.)

Head, long, 55 units; ao : po :: 36 : 16 (type female), 32 : 17 (allotype male); clypeus very narrow and pointed; upper groove between eyes shallow; rostrum passing backward beyond eyes by less than $\frac{1}{2}$ of po; antennae, 9 : 20 : 52 : x, (type female), 8 : 21 : 47 : x (allotype male).

Pronotum, long, 30 units, deep grooves running posteriorly on each side, characteristically; unpunctured.

Metanotum, not visible; wings long, concolorous.

Coxae, distance between I and II and II and III, 21–30 (female type), 20–30 (allotype male); coxae and acetabula glabrous, very small, acetabula unpunctured; legs slender, anterior femora not extending as far as antenniferous tu-

bercles, posterior femora reaching only to anterior margin of 5th abdominal segment.

Abdomen, 130 units long, terminal segments of type much broken, but it seems to be a female, to judge by the absence of abdominal processes; spines on male 6th abdominal segment, very small, sharp, black, close to the anterior margin of segment.

Length, 11 mm.

Type, female labelled "Amazone," from Staudinger, my coll.; allotype, male, Corumba, Brazil, Cornell Univ. Exped.; paratypes, females Lassance, Brazil; Cosquin, Argentine, Cornell Univ. Exped., in Cornell Univ. Coll.

This species is based on a specimen determined by Kirkaldy as *mentor* B. White with the three others mentioned. Clearly, it can not be the latter species, for in *kirkaldyana* the anteoctular part of the head is *more* than twice as long as the postocular, while in *mentor* it is *less* than one and a half times. Such a difference in the head structure is obvious to the naked eye; and it seems impossible that Buchanan White should have made such an error. For the rest, its distinctive characters are the absence of thoracic pitings and the comparatively short posterior legs. The former places it with *comata*, but the head and antennal proportions cut it off from this species.

Hydrometra cyprina n. sp.

Head, long, 62 units; $ao : po :: 35 : 20$; rostrum extending $\frac{3}{4}$ of po behind the eyes; clypeus truncate anteriorly, about as broad as long, and slightly narrowed at the base; antennae, $12 : 20 : 55 : 32$; upper groove of head obsolete, lower obvious, short.

Pronotum, long, 38 units; punctures present but evanescent, posterior lobe evanescently grooved longitudinally, pits more plain; on under side a row of punctures parallel to the anterior margin.

Metanotum covered by wings, which are full length.

Coxae, I to II and II to III, 24-34; pits present on all three acetabula, very evanescent and few in number on posterior, apparently three triangularly placed on each side of the coxal cleft in the two anterior coxae.

Anterior femora not passing the apex of the head; *posterior* barely passing apex of abdomen.

Abdomen, long, 120 units; male processes of the 6th abdominal segment spinose, curved backward; male terminal

segment short (nearly as broad as long, exclusive of the spine), spine long and sharp.

Length, 11 mm.

Type: Male from Santa Lucia, Veracruz, Mexico, Fred'k Knab, collector, U. S. N. M. No. 28289.

While this species runs by the key to *wileyi* its much smaller size cuts it off; and its lighter color as well, the latter being a light cinnamon brown, together with the extension of the rostrum.

The type has attached to its second abdominal segment a mature water mite, a peculiar condition in which to find a hydrachnid on its host.

Hydrometra consimilis Barber, 1923, Am. Mus. Novit. no. 75, p. 9.

Head, long, 57 units (female); 46 units, (male, U. S. N. M.), ao : po :: 35 : 15 (more or less), 28 : 13 (male, U. S. N. M.), clypeus small, narrow, pointed; rostrum extending $\frac{3}{4}$ po backward; antennae, 6 : 12 : 36 : 11.

Pronotum, long, 27 units; 23 units, U. S. N. M. male: a row of large punctures parallel to the anterior margin, growing shallower from the sides dorsally and obsolescent scattered punctures on the posterior lobe more or less in long rows.

Metanotum, 16 units to divarication; wings vestigial.

Coxae, I to II and II to III, 18-30 and 14-24; pits present on anterior and middle acetabula, 2 on each side of cleft.

Anterior femora barely passing middle of anterior expansion of the head; *posterior* not reaching anterior margin of 6th abdominal segment.

Abdomen, 90 units long; male processes of 6th abdominal segment linear, parallel to anterior margin of segment.

Length, 8 to 9.5 mm.

Redescribed from 3 females from Cuba, two from Santiago de las Vegas (S. C. Bruner) and one from Camagüey (J. Acuña); and 5 females and 1 male, Anaco Dist., P. R., July 3, 1917, No. 287, Harold Morrison, Collr., U. S. N. M. Collection. Barber's type is a macropterous male, from Coama Spgs., Pto. Rico.

This is the second species to be described from the West Indies, and the first species of all to be described fully and intelligently by its describer.

In general facies it somewhat resembles *hungerfordi* (here described), but the much longer rostrum, the punctures of the collar, of the posterior lobe of the pronotum, the acetabular pits and the

male ventral processes, added to the more general characters, sharply cut it off from that species. It is related to *martini* by the linear male ventral processes, but the thoracic punctures and acetabular pits, and the differently proportioned antennal segments set *consimilis* off.

Hydrometra hungerfordi n. sp.

(= *H. australis* Hungf. 1923, Can. Ent. LV: 54 et seqq., figs. 3, 4, 7, 14, 13).

Head, long, 55 units (female type), male 54, 60 units; ao : po :: 32 : 18 clypeus conical, glabrous; rostrum passing beyond middle of po by about 1 unit; antennae, type, 8:14:43:30 (varying, 8:14:37:25, or 8:15:40:x, or 8:15:42:27); upper groove between eyes short, as long as eye.

Pronotum, long 27 units (23, male in Parshley coll.), female, 31; no punctures posteriorly.

Coxae I to II and II to III, 17-28 (males), 20-30 females; pits present on anterior and middle acetabula, 2 on each side of the cleft.

Anterior femora not reaching antenniferous tubercles; *posterior* in male not passing middle of genital segment; in female not passing middle of 5th abdominal segment.

Abdomen, 82 units long (male type), 88, male and 110, female; male processes of the 6th abdominal segment conical, glabrous, very minute and close together and close to the anterior margin of the segment, black.

Length, 9 mm., male, 10.8 mm., female.

Type: Male, Atchison Co., Kans., July 11, 1924; allotype, female, Leavenworth Co., Kans., July 1, 1924, R. H. Beamer; paratypes, male, Riley Co., Kans., Sept. 8, J. H. Norton, 2 males and one female, the same, Aug. 27; 9 males, Cherokee Co., Kans., Aug. 16, 1920, 3 females, ditto, Hungerford and Beamer Collectors. Type and allotype in my collection, with two paratypes; other paratypes in collection University of Kansas (Cherokee Co. specimens) and in H. M. Parshley collection.

Based on my drawing in Canadian Entomologist, Dr. H. B. Hungerford determined this species as *H. australis* Say. However, on comparison it is evident that they are not the same. While on a description the male genital segment would seem to be identical, it is more cylindrical than in *australis* (Say) Bueno, which in the latter is slightly sinuate laterally seen from above; the terminal

spine also is much shorter and blunter. The head is comparatively shorter, the ao is subequal to the po, but in *australis* more than twice ($2\frac{1}{2}$ times) the po. The striking character is in the proportional lengths of the pronotum and metanotum; in *hungerfordi* the metanotum is about $\frac{1}{2}$ (31:15) the pronotum, and in *australis* about $\frac{2}{3}$ (30:20). This is clearly a distinct species, and I have pleasure in naming it in honor of my good friend, Dr. H. B. Hungerford, whose work in aquatic Hemiptera had added so much to our knowledge of the group in recent years.

Hydrometra lillianis n. sp.

Head, long, 51 units (male type), 60 units (female paratypes); ao : po :: 31 : 15 (type), 38 : 17 (females); upper groove between eyes strongly marked, as long as eye, lower, wide and longer extending backward within three-quarters of prosternum; clypeus truncate anteriorly, parallel sided, as long as wide, black; rostrum extending back $\frac{3}{5}$ of po; antennae, type, 10 : 13 : 47 : 23, females, 11 : 15 : 51 : 26.

Pronotum, long, 28 units (type), 32 units (females); pits present, large, evanescent, scattered, a row parallel to anterior margin of pronotum, going below; an impressed longitudinal median line, more or less punctate, evanescent anteriorly; pleura pitted.

Metanotum, long, 15 units (type), 17 units (females); wings brachyptera, narrow, straplike, longitudinal veins pronounced, extending to posterior coxae.

Coxae, I to II and II to III, 16–25 (type), 20–30 (females); all three acetabula pitted, pits scattered, more numerous on anterior and middle than on posterior, where they are scarcely visible.

Anterior femora reaching apex of head (type), attaining antenniferous tubercles (females); posterior just reaching apex of abdomen (type); not quite reaching middle of 6th abdominal segment (females), apically expanded.

Abdomen, 85 units long (type), 127 (females); male abdominal processes widely separated, set near connexivum, mammilose, blunt, inclined outward; male segment blunt, cylindrical, terminal process scarcely evident; female segment, broad, terminal process acute but short.

Length, 9 mm. (male), 11.8–11.35 (females).

Type, male, Santa Barbara, Calif., June; paratypes, 3 females, same data; my collection.

In all probability, this is the species from the Pacific coast that masquerades as *H. lineata* Say. Certainly, I have seen no other

species from California, so it is not quite possible to make a flat statement to this effect. Its dark color and velvety appearance show at once its distinctness from the glabrous apterous *martini*, were there not other extremely distinct specific characters to separate it, as for instance, numerous pits on the three acetabula, and the others here enumerated. Further, in general habitus, it is a much stouter species. It is also quite apart from the other Western and Southern species even in facies.

Hydrometra wileyi Hungerford, 1923, Can. Ent., LV: 55, figs. 1, 6, 9, 10, 11.

Head, long, 75 units (male), 78 (female); ao : po :: 45 : 22 (male), 50 : 25 (female); groove between eyes shallow, broad, on a slight elevation; clypeus broad, truncate, black, glabrous; rostrum extending back $\frac{1}{2}$ of po; antennae, 16 : 25 : 70 : 32 (segment IV absent in my specimens, and refigured from the original description).

Pronotum, long, 44 units (male), 49 (female), sparse colorous shallow punctures or pits on posterior lobe.

Metanotum, 35 units (male), 40 (female), estimated; wings long; in specimens described, narrow, straplike, just passing anterior margin of 2d abdominal segment.

Coxae, I to II and II to III, 30-55; two anterior acetabula with numerous pits.

Anterior femora, male, not quite reaching apex of head; female, noticeably passing it; *posterior femora*, male, passing extremity of abdomen, female, not quite reaching posterior margin of 5th abdominal segment.

Abdomen, 115 units long (male), 130 (female); male abdominal processes acuminate, widely separated; male segment more or less oval, pointed.

Length, male, 13 $\frac{1}{2}$ mm., female, 15 mm.

This species has been redescribed from the paratypes, from Colorado Co., Texas, received from Dr. Hungerford by Mr. H. G. Barber, Dr. H. M. Parshley and myself. The material, therefore, is authentic. Some slight differences in dimensions may be noted from Dr. Hungerford's description, but they are not beyond the limits of variability in *Hydrometra*. It is a light colored form, of a size and general aspect of *H. championiana* (*caraiiba* Champ., nec Guérin), but its well-marked male processes are sufficient to distinguish it, apart from other characters.

Hydrometra martini Kirkaldy, 1900, Entomologist, XXXIII: 175; Hungerford, 1923, Can. Ent. LV: 54-55, figs. 2, 5 and 12; Bueno, 1923, Hem. Conn. 663, p. 152. = *lineata* Say, 1832, Descr. Het. Hem., p. 35 (for full synonymy, see Van Duzee, Catalogue).

Head, long, 48 to 51 units; clypeus, narrow, conical; rostrum extending backward $\frac{2}{3}$ po; antennae, 8 : 16 : 40 : 22, mean proportions.

Pronotum, long, 26 units, a few scattered punctures on the posterior lobe.

Metanotum, 20 units; wings absent except for little black vestigial nubbins appearing under the edge of the pronotum; some few are fully winged, as noted before.

Coxae, I to II and II to III, 17-25; two anterior pairs of acetabula with two pits each.

Posterior femora, not reaching last abdominal segment (female), not reaching middle of last abdominal segment (male).

Abdomen, 75 units to 100 units; male abdominal processes linear, transverse.

Length, 8.5 mm. to 9.85 mm.

This is the best known North American species of the genus, reported from all over the country. It ranges from Canada down the Atlantic coast to Florida and probably west beyond the Mississippi into Texas. For the present purpose it has been deemed the representative species of a group. It may seem, however, that in view of its generalized aspect and mean facies, other of the species named herein may have been determined as this by American hemipterists. Be this as it may, in view of the distribution above, it is certainly the most widespread, and while it may have been cited in error from particular localities on a basis of other species resembling it (*e.g.*, *myrae*), it will in all likelihood be found all over, as recorded.

It is a most useful species for study because of its abundance and domesticability. Much work has been done on its life history and habits, which is given in Hungerford's Biology of the Waterbugs. But much remains to be done in its embryology, and morphology.

✓ *Hydrometra myrae* n. sp.

Head, long, 51 units (male type), 53 (male paratype), 56 (female paratypes); ao : po :: 31 : 15 (type), 36 : 19 (paratype male) 34 : 18 (females); groove between eyes

shorter than eye, narrow, deep; clypeus small, narrow, conical; rostrum extending back $\frac{3}{4}$ of po; antennae, 7 : 20 : 43 : 21 (type), 8 : 20 : 43 : 22 (paratypes).

Pronotum, long, 26 units (type) 30 units (female paratypes); pits minute, scattered.

Metanotum, long 18 units (paratypes male and female, apterous), not visible in the macropterous male type and female allotype. Wings in male type long, reaching to a little beyond middle of 4th segment of abdomen; in female paratypes to about middle of the same segment; in the apterous (micropterous) paratypes, vestigial.

Coxae, I to II and II to III, 20-25 (type), 20-31, female paratypes; pits present on 1st and 2d acetabula, one on each side of the cleft, at the margin of the acetabula.

Anterior femora, not reaching antennal tubercles, males; just reaching them, females; *posterior femora*, nearly reaching distal margin of 6th abdominal segment (male type), reaching to about middle of 5th segment (females).

Abdomen, 98 units (male type), 120 to 125 (females); male abdominal processes, linear, curved, black, as in *martini*; male terminal segment suddenly widened, with a long stout spine.

Length, type, 8.75 mm., apterous males, 9.75 mm., winged females, 10.55 mm., apterous, 11.2 mm., all from Billy's Island, Okeefeenokee Swamp, Ga., J. C. Bradley, Collr.

Type, allotype and morphotype, Cornell Univ. Colln., paratypes, same and coll. J. R. de la Torre-Bueno.

This species is quite close to *H. martini*, from which its more slender general aspect distinguishes it at first sight. The body segments in general are lengthened out. The fixed differential characters lie in antennal segment II, which in *myrae* is $2\frac{1}{2}$ as long as I and subequal to IV; while in *martini* it is only twice as long as I and about $\frac{2}{3}$ or $\frac{4}{5}$ times IV; and in the more exaggerated outlines of the male terminal segment. It is also similar to *H. husseyi*, but the linear male processes at once cleanly separate it from the Paraguayan species, and the different antennal proportions as well.

/ *Hydrometra husseyi* n. sp.

Head, long, 54 units (male type), 57, 58 (female paratypes); ao : po :: 32 : 16 (type), 35 : 17 and 36 : 18 (paratypes); upper head groove short, not longer than eye, shallow, linear, in female longer than eye; clypeus small, conical for about $\frac{1}{2}$ its length; rostrum extending half way the po

behind the eyes; antennae, 8 : 18 : 42 : 19 (male), 9 : 19 : 40 : x, 9 : 20 : 36 (this joint appears to be broken) : x (last joint missing in the two females).

Pronotum, long, 30 units (male), 32 units (alate female), 34 (apterous female); punctures on the posterior lobe of the pronotum large, very shallow, irregularly scattered, more like depressions than pits.

Metanotum, concealed under the wings of the alate type and paratype; 18 units in micropterous morphotype (female); hemielytra reaching to middle of 6th abdominal segment (male); microptera not quite half as long as metanotum to divarication, narrow, straplike.

Coxae, I to II and II to III, 20-29 (type male), 23-32, 23-31 (females); pits present on anterior and intermediate acetabula, one on each side of the cleft, none on third acetabulum, acetabula polished.

Anterior femora, not reaching antennal tubercles; *posterior femora* reaching suture between 5th and 6th abdominal segments (male) just passing it (females).

Abdomen, 119 units (male), 145 (alate female), 127 (apterous female); male processes spinous, curved backward, sharp, set at anterior margin of segment; male terminal process long, slender, black, more than half as long as the genital segment is wide at the widest part, which segment including spine is as long as last abdominal segment proper, which in turn is excavated beneath on the posterior margin for genital segment; the male terminal process is the longest and slenderest noted; in the female also the process is long and slender, as long as the segment is wide.

Length, type, 10.15 mm.; allotype, alate, 11.7 mm.; morphotype, apterous female, 12.35 mm.

Type, male, Villa Rica, Paraguay, 11 : IX : 1923 (P. Jorgensen); allotype, same data; morphotype, micropterous female, No. 28,290 U. S. N. M., labelled "Peru" "P. R. Uhler Colln." (Note—The morphotype is a light yellowish or clay color, seemingly glabrous; probably a very old specimen, much faded.)

Type, in collection R. F. Hussey; allotype in my collection; morphotype in U. S. National Museum.

This species, based on the three specimens named, was originally identified by Dr. R. F. Hussey (in whose honor it is named), as *Hydrometra argentina* Berg, described originally from a single male specimen, but it can not be that species. Berg, in his description, says: "antennis gracilibus, longitudine articulorum ut in *H. stagnorum*." The segments in the European species are 10 : 15 : 50 :

28, while in the one here described they are as 8 : 18 : 42 : 19, a notable discrepancy not to be explained on any theory of variability of proportions.

It clearly belongs also in the *martini* group with two pits on the anterior pairs of acetabula, but differs from it in the male ventral processes and in the other characters used in the key to distinguish it.

This is another species that has been taken at light.

✓ *Hydrometra caraiba* Guérin, 1856, in Sagra's Hist. Cuba, pt. 2, VII, p. 173.

Head, ao twice po.

Length, 22 mm.

These are the only two structural characters mentioned in the original description, which follows.

“Hydrometra. Supra fusco-ferruginea, subtus albo-argentea; thorace linea longitudinali alba nigro-marginata; elytris obscure fuscis, immaculatis; pedibus obscure ferruginis basi dilutioribus. Larg. 22; anch. 1 millim.

“Esta linda especie se distingue de la *H. stagnorum* de Europa por su tamaño algo mayor, por su cabeza aún mas alargada, teniendo los ojos al tercio de su longitud, mientras que se hallan casi al medio en la especie tipo, y por el bello color blanco plateado de su parte inferior.

“Solo conocemos un individuo que forma parte de la colección de M. Signoret, que le fué remitido por M. Dohrn, como procedente de la Isla de Cuba.”

Guérin's description of his species, particularly the black-margined longitudinal white line of the thorax, might possibly apply to the Central American species so named by Champion, except for the fact that there are two more which have this characteristic—namely, *exilis* and *priscillae*, herein described as new. All three species, however, have the anterior part of the head visibly much more than twice the length of the posterior, besides not attaining the enormous (for a *Hydrometra*) length of 22 mm. The other difference lies in the antennae, which are in *caraiba* as in *stagnorum*. This is not quite clear, but if it refers to the antennal proportions, in *stagnorum* these are: 10 : 15 : 50 : 18; in *exilis*, 13 : 23 : 90 : x; in *priscillae*, 11 : 24 : 84 : 45; in *championiana* Bueno (*caraiba* Champion, nec Guérin) 13 : 27 : 80 : 38, varying to 14 : 31 : 95 : 45. That is to say, in *caraiba*, segment II is 1½ times I and IV not

quite twice I; while in the others segment II is approximately twice I and segment IV more than three times I. It may seem to belong to the same general group, and when finally rediscovered will be found doubtless to have the three acetabula pitted and dull, as in the three species with which it has been contrasted. It may even turn out to be a gigantic specimen of one of these three, in view of the distribution and the large size of some of the specimens of *championiana*. Meantime, it seems advisable to maintain its specific identity, since there are no specimens in hand with the structural details named for *caraiba* by its author.

✓ *Hydrometra metator* F. B. White, 1879, Journ. Linn. Soc. Lond., Zool., XIV, p. 486.

Head, ao twice po.

Antennae, segment IV twice I.

Length, 18 mm., width, 1 mm.

The original description reads thus: "9. *Hydrometra metator*, n. sp. Aptera, brunnea, opaca; antennarum articulo primi dimidio apicali, secundi apice et articulis 2 apicalibus (tertio ad basin excepto), rostro apice, femorum et tibiaram apicibus, necnon tarsis nigris; antennis gracillimis, corporis aequilongis. Male, long. 18, lat. 1 mm."

"*Hab.*, Brasiliam borealem (Uragaca, Rio Jurua, Nov. 1, 1874, J. W. H. Trail)."

This species has one character beyond its length to distinguish it from all other *Hydrometrae*—its antennae are as long as the body! Moreover, its antennal segment IV is only twice antennal segment I. The first peculiarity is so unusual that it sets it apart alone. It may well be a mistake in measurement; or else an obscure statement of proportion. In any case, in the absence of the type and of any specimen which might meet the description in this and in the anteocular and postocular proportions, its identity should be preserved until these obscurities may be cleared up.

Hydrometra comata n. sp.

Head, long, 65 units; ao:po::40:18; clypeus broad, excavate anteriorly; upper groove between eyes very faint; rostrum passing eyes by $\frac{3}{4}$ po; antennae, 15 : 21 :: 66 : x.

Pronotum, long, 35 units; unpunctured.

Metanotum, long, 25 units; micropterous, wings strap-like.

Coxae, distance between I and II and II and III, 20-37; neither acetabula (which are dull pilose) nor pleura punctured.

Anterior femora surpassing apex of head by about 1/5 their own length, *posterior* lost in type (but probably greatly surpassing tip of abdomen).

Abdomen, long, 100 units; male processes stout, blunt, mammilose, placed close to the anterior margin of the segment, terminal segment with an upwardly inclined long sharp black spine.

Length, 11.25 mm.

Type, male, Trinidad, West Indies, Chipman; my collection.

In addition to the structural characters mentioned, segments 2 to 6 of the abdomen are dorsally glabrous, segment 7 dull, pilose, with an anterior glabrous spot; the genital segment also is dull pilose. The under side of the body has sparse long fine erect grey hairs; dark beneath, with a darker median line.

This is one of those species which has lain undetermined in my collection. I am indebted for the type to my good friend and kind mentor, Mr. E. P. Van Duzee, who had it from Chipman. His label read: "near *mentor* B. White." Of course, it could not be this species since the antecular part of the head is proportionally much longer than the postocular (40 : 18, that is, about 2¼ times as long, while *mentor* is barely 1½ times as long). The absence of any additional characters for *mentor* is offset entirely by the unique head proportions. The size means nothing, as it is within the limits of variability within the species.

Hydrometra comata is one of the two species without thoracic punctures, which character at once sets it apart from all the other species known to me in nature, except *H. kirkaldyana*. From this last, however, the head and antennal proportions and the extension of the rostrum abundantly separate it, as is brought out in the key to the species. In addition, the acetabula are dull pilose in this species, but glabrous in *kirkaldyana*.

Hydrometra exilis n. sp.

Head, male, long, 81 to 83 units, female, 88; ao:po::55:20, male, to 56:21, female, 58:23; clypeus as wide as long, acuminate angularly; upper groove between eyes shallow, short, not as long as eye, lower, running back from eyes nearly to pronotum, anterior groove deep, nearly as long as

the expanded part of the head; rostrum passing eyes by about $\frac{1}{2}$ po: antennae varying between 13 : 23 : 90 : 43 (males) and 13 : 24 : 95 : 45 (females). (These proportions vary by one or two units one way or the other, which seems to be the normal fluctuation.) Antennal tubercles very small, glabrous.

Pronotum, long, males, 40 (type), 42, 43; females, 45; punctures large and deep on posterior lobe which has a longitudinal pitted groove, propleura back of acetabula pitted; a collar goes all around the anterior part of pronotum.

Metanotum, concealed by full length wings.

Coxae, distance between I and II and II and III, males, 25-42 (type), 25-43; females, 28-45; pits present on all three acetabula, numerous and deep on both sides of the coxal cleft.

Anterior femora, male, just passing apex of head; female, passing apex of head by about 5 to 10 units; *posterior femora*, males, passing apex of abdomen by about $\frac{1}{4}$ their length; female, by nearly $\frac{1}{3}$ their length.

Abdomen, long, 132 units (male type), 130, 138 (paratypes); 150 (allotype and female paratypes). Male abdominal processes, acute, long, mucronate, black-tipped, set a little less than half the length of the segment from its anterior margin; terminal segment nearly cylindrical, apical spine blunt, short; female apical process very small, nearly imperceptible.

Length, males, 12.65 mm. (type), 12.7, 13.2 (paratypes); 14.15 (allotype and female paratypes).

Type: Male, macropterous, from Ceiba, Honduras, F. J. Dyer, collector, U. S. N. M. No. 22654, type No. 28, 288, in U. S. N. M. collection; allotype, female, Tela, Honduras, 1. IV. '23, F. H. Hubbell, collector; paratypes, 4 males and 5 females, same data, all numbered 170. Type in U. S. N. M.; allotype and 5 paratypes in coll. University of Michigan, 4 paratypes in my collection.

We have here a species closely related (in color) to *championiana* and *caraiba*, being of the same brown with a dark-margined light pronotal stripe. It has, however, acuminate male abdominal processes, not linear, as in the former; and the male segment nearly cylindrical as seen from above, with the terminal spine short and small. It is also a much smaller insect. This color identity but structural difference is another indication of the unreliability of color as a specific criterion in the genus.

Hydrometra naiades Kirkaldy, 1902, Entomologist, XXXV: 281
 = *mentor* Champion, 1898, Biol. C. Am., Hem. Het., II: 124-5.

Head, long, 50 to 60 units (females); ao:po::36:18, 38:20; rostrum extending about $\frac{2}{3}$ po behind eyes; clypeus narrow, acuminate; antennae, 8:23:56:23; upper groove of head narrow and fine, lower groove short, shallow, barely exceeding diameter of eye.

Pronotum, long, 26 to 29 units, a few shallow obsolete punctures on the posterior lobe.

Metanotum, 19-20 units long to divarication. Wings vestigial.

Coxae, I to II and II to III, 16-32; two pits on each acetabulum, one on each side of the cleft; first and second acetabula polished.

Anterior femora scarcely reaching the antennal tubercles; *posterior* just passing the anterior margin of the 5th abdominal segment.

Abdomen, long, 95-114 units, females only; female terminal process very long and slender.

Length, 9.5-11.25 mm.

This description is drawn up from 4 females from Los Amates, Guatemala, 16. I. 5, Prof. J. S. Hine, collector. The groove under the head is quite plain between the eyes, but at times extends evanescently beyond them. It is light-colored for a *Hydrometra*.

Champion⁵ in his comments on this species says: "Some North American specimens in the British Museum, received from Doubleday, are very like *H. mentor*" (this being the name under which he referred to it, later changed by Kirkaldy to *naiades*). It is obvious that he had specimens of *martini* before him, to which species *naiades* is indeed much akin. But the antennae with segment II nearly three times I (in *martini* twice I); the notably different proportional distances between the coxae; and the very long spine on the female terminal segment, are additional differences.

From *H. myrae*, the rostrum and the distances between coxae sharply cut it off. It is, however, another of the *martini* group, as is evidenced by the characteristic two punctures on the first and second acetabula.

✓ *Hydrometra australis* Say, 1832, Deser. Het. Hem., p. 35 (Fitch reprint, p. 807); Compl. Wrtgs., I: 361; Bueno, 1905, Can. Ent., XXXVII: 15, fig. 3; (nec Hungerford, 1923, Can. Ent., LV: 54/58).

⁵ Biol. C. A., Het. II, p. 126.

Head, long, 65 units; $ao:po::42:18$; rostrum reaching nearly to base of head, $5/6 po$; clypeus acute, nearly twice as long as wide, black, polished; antennae, $9:21::51:x$; upper groove between eyes deep.

Pronotum, long, 30 units; punctures absent.

Metanotum, long, 20 units, to divarication; entirely apterous.

Coxae, I to II and II to III, 20–30; a few scattering deep, large punctures on the first and second acetabula, on each side of the coxal cleft.

Anterior femora not passing apex of head; *posterior* not exceeding abdomen.

Abdomen, long, 97 units; male abdominal processes sharp, spinose, directed back; male segment globose, apex produced in a short blunt glabrous process or spine.

Length, 10.6 mm.

Described from the same male specimen from Thomasville, Ga., from which the original drawing of the genitalia was made and figured in the Canadian Entomologist (*supra*). This specimen may therefore be deemed the autotype. Other records are from Florida (Slosson and Blatchley). The original specimen came from Louisiana.

Say's description of his "var. *australis*" may fit almost any of the slender forms from the Southern states (*e.g.*, *myrae*). The lateral whitish points may be observed in other species as well, and are not always visible. However, in the absence of Say's type, we must take whatever most closely approximates the description; and since from locality and general characteristics the species in question has been so determined, it is best so-called. If not, Say's variety would remain among the unknown species.

The characters distinguishing this species from *H. hungerfordi* have already been commented upon. The ventral processes in the males are enough to separate it from *martini*, even without taking into consideration the differing antennal proportions, rostral length, acetabular punctures and other differential structures named in the key and the descriptions.

Hydrometra gibara n. sp.

Head, long, 68 units; $ao:po::42:19$; rostrum extending $2/3$ of po behind eyes; antennae, $13:20:60:36$; upper groove of head visible, lower longer and not so deep.

Pronotum, long, 35 units; row of deep punctures parallel

to anterior margin, a long row of median punctures starting about $\frac{2}{5}$ the length of pronotum from the anterior edge.

Metanotum, concealed by vestigial wings.

Coxae, I to II and II to III, 23-37; a few evanescent pits on anterior and middle acetabula.

Anterior femora passing apex of head; *posterior femora* just passing apex of abdomen.

Abdomen, long, 100 units; male abdominal processes spinous, moderately long, stout, sharp, divaricating, curved backward, near anterior margin of segment; male segment terminating in a long, slender spinous process.

Length, 11.4 mm.

Described from one male, Camagüey, Cuba, July 22, 1923, collected by J. Acuña.

This well-defined species comes in what might be called the *martini* group, with punctured pronotum, anterior and mid-acetabula glabrous, with few punctures. The length of the head, the head proportions, and the spinous ventral processes of the male sixth abdominal segment separate it sharply.

Hydrometra championiana n. n.

= *H. caraiiba* Champion, 1898, Biol. C.-Am., Hem.-Het., II; 124 (nec Guérin, 1856, l. c.).

Head, long, 90 units; rostrum just reaching middle of eye; clypeus broad as long, obtusely pointed, sides parallel, polished, black; antennae, 13:27:94:38; head grooves present and somewhat variable.

Pronotum, long, 47 units (alate male); anterior collar of punctures, median longitudinal row of punctures on posterior lobe and larger pits in rows, propleura with three marginal rows of pits.

Metanotum, concealed under sooty wings which reach nearly to middle of 5th abdominal segment.

Coxae, I to II and II to III, 30-45; all three acetabula pitted, dull pilose.

Anterior femora, barely reaching or just passing apex of head; *posterior femora* passing apex of abdomen by about one-fifth of their own length.

Abdomen, 135 units long (from posterior margin of pronotum); male abdominal processes crescentic thickenings converging anteriorly, the ends equidistant from the respective anterior and posterior margins of the segment, broad, black, hairy; male segment underside compressed medially

to a broad keel for about $\frac{1}{2}$ its length, the terminal spine short but pointed; female segment also terminated in a spine.
Length, 14.5 mm.

Redescribed from a male from Los Amates, Guatemala, 16 January, 1905, taken by Prof. J. S. Hine, from which locality there is a long series, alate and apterous males and females. Further localities are: Gualán, Guatemala 15. I. 50 (Hine); Rio Machuca, C. R. (Biolley); Rio Frio, Colombia, 23. II. 25 and 6. III. 25 (Fred M. Walker).

Strange though it may seem, workers in certain of the groups of aquatic Heteroptera employ a procrustean method in making species fit. For example, in his extremely parsimonious description of *Hydrometra caraiba* (see p. 113, *ante*), Guérin makes two positive statements, which I translate from the original Spanish: "Long. 22, wid., 1 mm." is the first; the second is: "this beautiful species is to be distinguished from *H. stagnorum* of Europe, by its somewhat larger size, by its somewhat more lengthened head which has its eyes at about one-third of its length, while they are nearly at the middle in the type species." In the face of these two statements (to which he refers), Champion records two specimens of a species from Panama, which, he states, "agree sufficiently well with Guérin's description of *H. caraiba*," even though the larger of the two, a female, is only 16 mm. in length, as against the length of 22 mm. in the original description cited; and the antecular part of whose head is $2\frac{1}{2}$ times the postocular, instead of only twice, as distinctly stated by Guérin. While there are fluctuations in length in *Hydrometrae* within a species, these are not so gross; and the head proportions seem a fixed and reliable character to differentiate species in the genus. It is clear that whatever Champion had, it is *not caraiba* of Guérin, but an undescribed species, which, in honor of the first to diagnose it, I here call *championiana*.

In *H. championiana* brachyptery reduces the number of punctures on the acetabula as well as their size; and also reduces the number of punctures on the ascending margin of the propleura.

This species is the representative of a group in which all 3 acetabula are pitted more or less deeply, the other being *priscillae* Bueno and *exilis* Bueno, herein described. In this group we see that "shuffling of characters" mentioned by Parshley in his "Essay on Aradus."⁶ In general facies the three are very similar, as well as in coloration, but starting with the male abdominal processes we

⁶ 1921, Trans. Am. Ent. Soc. XLVII: 1, 106, pls. 1-7.

note a series of differences in the structures deemed critical, as the key amply indicates.

In *H. championiana* there are certain variations from the mean as between specimens from the same locality; and much more superficially notable in specimens from distant parts.

The head varies in length from 4.5 mm. in the male plesiotype to between 4.65 and 4.35 mm.; the ao and po proportions vary from 61:21 in the plesiotype, to 63:23, 58:20, 60:22, etc.; the rostrum just reaches or just passes the eyes; and other variations might be noted, but rather unprofitably, since all seem to fluctuate about a norm, which seems well represented by the plesiotype.

A male from Carabela Grande, Cuba, in the collection of the Estación Central Agronómica, at Santiago de las Vegas, Cuba, offers certain variations, but well within the norm. The head is 96 units; ao:po :: 65:24; clypeus as in typical *championiana*; antennae 14:31:95:45; pronotum, long, 46; pits as in *championiana*, etc.: coxae, 30-50; apex of anterior femora slightly exceeding apex of head; length, 15.1 mm. Another specimen from Pto. America, Rio Putumayo, Brazil, Aug. 30, 1920, Cornell University Expedition, in the Cornell collection, at first sight, because of the greater length of head, etc., was deemed to represent a different species, yet the critical measurements preserve the proportions. The head is 105 units; ao:po :: 73:25; clypeus normal; coxae, 33-55 (=3-5, as in *championiana*). Comparison with a typical specimen from Gualán, Gta., showed them to be alike. It seemed at first as though we might here have Buchanan White's *H. metator*, but it cannot be this species, since the antennae are not as long as the body (223 units as against 335). If, however, by *body* Buchanan White means the length of the insect *less the head*, then this condition is fulfilled; and *H. championiana* Bueno would be known as *H. metator* B. W.

Hydrometra cordubense n. sp.

Head, long, 58 units (type male), 60, (male paratypes), 68, (allotype and morphotype, alate female), 65, (female paratype); ao:po :: 37:17 (type), 37:18 (male paratypes), 43:20 female allotype and morphotype), 40:18 (female paratype); rostrum just passing posterior margin of eyes in all specimens; clypeus, bluntly conical, glabrous, yellow; antennae, 12:19:60:36 (type), 12:21:63:38 (allotype), 12:20:56:35 (morphotypes); upper and lower grooves of head short, about equal to each other and to the diameter of the eyes.

Pronotum, long, 28 units (type and male paratypes), 35 (female allotype), 37 (female morphotype); punctures on anterior collar and posterior lobe, an indented line on posterior lobe.

Metanotum, long, 13 units (type), 14, 16 (male paratypes), 15 (female allo- and paratype), not measurable in morphotype; wings vestigial in type and male paratypes and allotype, present in female morphotype and passing apex of fifth abdominal segment.

Coxae, I to II and II to III, 15-18 (in all specimens); all acetabula pitted, 3 large deep pits parallel to the lower margin of the anterior acetabulum, the middle pit being one of three in a line posterior to the cleft; intermediate, 1 deep large pit at bottom anteriorly, three in front of the cleft, two large deep ones posteriorly; third acetabulum with three pits arranged triangularly, apex at the cleft and the other two in line parallel to it, a slitlike puncture directly above cleft of anterior acetabulum.

Anterior femora just reaching antennal tubercle (type), passing apex of head (male paratypes), not exceeding apex of head but just passing antennal tubercles (females); *posterior femora* greatly exceeding end of abdomen (all specimens).

Abdomen, long, 83 units (type), 85, 80 (male paratypes); 100 (allotype), 90 (female paratype), 115 (female morphotype). Male has neither abdominal processes nor tumescences; terminal segment equal to last abdominal in length, compressed below, terminal spine short, blunt, thick. Female terminal segment spine short, blunt.

Length, 9.1 mm. (type), 9.2, 9.35 (male paratypes), 10.9 (allotype), 10.2 (female paratype), 11 mm. (female morphotype).

Type: Male, apterous, Cordoba, Veracruz, Mexico, January 16, 1901, Fred'k Knab, Collector, No. 28287 U. S. N. M.: allotype, female, Acapulco, Mexico, 29.7 Fred'k Knab, Collector; morphotype, alate female, same data; paratypes, 2 males (one apterous) and 2 females (apterous), same data, apterous male and female, 15.6, same place; and 1 alate female, 30.7 and 1 apterous female, 29.7, from Acapulco, Mexico, same collector.

The type and allotype are the only perfect specimens; the antennae are missing or imperfect in the paratypes. In the allotype female there are two large deep pits placed far apart before the anterior acetabula and parallel to the anterior row of pits. In the female morphotype the thoracic pits are deeper and linearly

arranged; the scutellum is evident, with a sharp longitudinal keel; the pronotum *stout*, much stouter than in the apterous; the wings pass the apex of the 5th abdominal segment; the abdomen curves up in the female, which is also seen in other species.

Hydrometra lentipes Champion, 1898, Biol. C.-Am., Hem.-Het., II; 124/5.

Head, long, 61, 64 units (males), 70 (females); ao:po:: 37:17, 40:18 (males), 43:20 (females); rostrum just passing eyes; clypeus narrow, acuminate; antennae, 13:21:65:x, 12:20:65:x, 12:20:63:x (males), 12:21:64:34 (female); upper groove of head shorter and shallower than lower groove, which becomes obsolete toward its ends.

Pronotum, long, 30 units (males), 35, (females); a row of deep subapical pits parallel to the anterior margin and close to it, nearly encircling thorax, the posterior part with scattered punctures.

Metanotum, long, 21 units (males), 20 (female); wings vestigial.

Coxae, I to II and II to III, 18-32 (males), 21-34 (females); punctured scatteringly on all three acetabula with deep punctures.

Anterior femora passing apex of head, males; not passing apex of head, females; *posterior femora* considerably passing apex of abdomen.

Abdomen, long 85, 90 units (males), 102 (female); male abdominal processes entirely absent; male segment hairy, narrowing apically, terminal process stoutish, blunt; female segment broad with a long slender spine.

Length, males, 10 to 10.25 mm.; female, 11.35 mm.

This species, originally described from Guatemala, is redescribed from 4 specimens from Costa Rica, collected by the late Professor Paul Biolley, 2 males from Rio Tiribi near San José at an elevation of 1100 metres; and one male and one female from Cangrejales de Asseri on the Pacific side, at 800 metres, the male of these two being the plesiotype and the female and the other two males the plesio-paratypes.

H. lentipes agrees with *H. priscillae* in the absence of male abdominal processes and in the pitting of the three acetabula, although neither so deeply nor so abundantly; but of course, the other characters separate it—the length, the head proportions, the antennae, the coxal distances, etc.

Hydrometra priscillae n. sp.

Head, long, 84 units (male type), 82, 85 (male paratypes), 87 (allotype, apterous female); ao:po::56:22 (male type), 55:22, 56:21 (male paratypes), 58:23 (allotype); rostrum not passing eyes posteriorly; clypeus bluntly angulate anteriorly, glabrous, black; antennae, 11:24:84:45 (type male), 11:25:75:44 (allotype); upper groove of head shallow, about as long as eyes, lower groove very broad, evanescent posteriorly and extending much beyond eyes.

Pronotum, long, 42 units (type), 41 (male paratype), 46 (allotype); anterior lobe not pitted, posterior with scattered but not deep pits, anterior collar of large shallow pits, a groove runs the whole length of the pronotum, pitted, one row of large deep pits follows the edge of the pleura up into the notum.

Metanotum, long, 23 units; wings, reduced to strap-like microptera.

Coxae, I to II and II to III, 27-45 (type and paratypes), 28-45 (allotype). All three acetabula deeply coarsely pitted.

Anterior femora scarcely reaching antennal tubercles; *posterior femora* going much beyond apex of abdomen.

Abdomen, long, 117 units (type), 138, 141 (paratypes), 164 (allotype); male abdominal processes reduced to lateral swellings in the 6th segment, with long, fine hairs arising therefrom; male segment cylindrical, not compressed beneath into a longitudinal keel; spine very short, acuminate.

Length, type, male, 13.25 mm.; paratypes, 14.25, 14.75 mm.; allotype, 16 mm.

Described from 6 males and one female from Los Amates, Guatemala, January 16, 1905, collected by Dr. J. S. Hine. Types in my collection.

This is a lighter colored species than *H. championiana*, with a more slender head and only one row of pleural pits.

✓ *Hydrometra agenor* Kirkaldy, 1902, Entomologist, XXV: 280.

Head, rostrum reaching eyes but not beyond; antennae, 12:20:80:40 (estimated from description).

Anterior femora, scarcely reaching apex of head.

Long, 13.5 mm.

In this species we have more abundant structural characters and it becomes possible to fix it with a fair degree of certainty. Working back from the given dimensions on the unit system here used, we find that the ao is to the po more or less as 50 to 24. The

antennal segments are stated to be about $\frac{2}{3}$ the length of the bug, that is about 180 units, roughly proportioned as above.

These characteristics, in connection with the size, put it into the *H. championiana* class, with all three acetabula pitted, not polished. It may even develop at some future time that it is identical with one of the species in that aggregation. At the moment, absence of specimens makes it desirable to retain it as a distinct species, as indeed it has every evidence of being.

The original description is as follows:

“Brownish castaneous, a narrow median longitudinal very pale bluish grey line on pronotum, apical margin of pronotum black. Antennae (except pallid base of first segment), apex of head, etc., black. Abdomen above shining black, connexivum flavo-stramineous, extero-lateral margin narrowly black. Abdomen beneath pale flavous, except the dark genital segments. Legs pale flavo-fuscous, tarsi and apices of femora and tibiae black. Elytra lurid, nervures black. Rostrum reaching to eyes, but not beyond; antennae equal to about two-thirds of the insect's length; antecular part of head more than twice as long as the postocular; head somewhat dilated at apex, scarcely so at base; antecular part of head four times as long as first segment of antennae, third more than twice as long as fourth, four times as long as second, which is two-thirds longer than the first. Apex of anterior femur scarcely reaching apex of head. Male. Long. $13\frac{1}{2}$ mill. *Hap.* ECUADOR, Guayaquil (Colln. Montandon).”

/ *Hydrometra argentina* Berg, 1879, Hem. Arg., p. 182.

The original description of this species gives no characters to fit it into the general scheme of this monograph; and not alone is it unknown to me in nature, but it is doubtful that it could be recognized without a comparison with the type.

“♂: Sublinearis, sordide testaceus, antennis, capitis parte postoculari utrimque, pectoris lateribus, rostri articulo terminali, connexivi marginibus utroque nec non hemelytro-rum venis obscuribus vel fuscis, pedibus fusecenti-testaceis, margine interiore hemelytrorum albedo-maculato; capite tenui, apicem versus modice incrassato, apice ipso conico, flavescenti, medio parum elevato, obsolete fusco; antennis gracilibus, longitudine articulorum ut in *H. stagnorum*; rostro valde ultra oculos extenso, articulo prima brevissimo; pronoto fere parallelo, ante medium subtilissime constricto, postice retrorsum declivi; hemelytris angustiusculis, prope segmentum quintum extensis, venis duabus transversis fuscis

ante apicem maculisque albidis marginis interioris distinctis; alis albis, subopalinis; pedibus gracilibus, unicoloribus; femoribus posticis hemelytris paullo longioribus.—Long. $11\frac{1}{2}$; lat. pron. abdominisque $\frac{3}{4}$ mm. Patria: Buenos Aires.”

Hydrometra chilensis Reed, 1901, Rev. Chil. Hist. Nat., V, page (103 of reprint).

This is another species which cannot be described in the form herein employed. The original Spanish description follows:

“*Limnobates chilensis*, spc. nov. De un bruno negruzco por encima, amarillento por debajo, en algunos ejemplares; en otros de un testaceo pálido. Antenas y patas del color del cuerpo, con las articulaciones y extremidades más oscuras. Una línea amarillenta corre por los lados del protorax y a veces por los del abdomen. En algunos ejemplares hai una línea pálida, longitudinal en medio del pronoto.

“Hai much variación en el desarrollo de las alas; en muchos ejemplares se encuentran rudimentos como la cuarta parte del pronoto, en otros son mas largos, y en individuos bien desarrollados son casi del largo del abdomen.

“Largo, 10 milímetros.”

Baños de Cauquenes, Chile.

The English of it is:

“Of a blackish brown above, yellowish below, in some specimens; in others of a pale testaceous. Antennae and legs of the color of the body, with the joints and tips darker. A yellowish line runs along the sides of the prothorax and sometimes of the abdomen. In some examples there is a pale longitudinal line in the middle of the pronotum.

“There is much variation in the development of the wings; in many examples there are rudiments about a fourth of the pronotum, in others they are longer, and in well-developed individuals they are nearly as long as the abdomen. Length, 10 mm.”

The original descriptions of these two species preceding are given for what they are worth. In time, doubtless, these species will be found, recognized and definitely placed by some competent hemipterist. At the moment, these two species are included to complete the tale.

X

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XI

CONCLUDING COMMENTS

In the preparation of this paper, I have been much helped by the critical comments of Dr. R. F. Hussey, who has pointed out, as elsewhere noted, obscure structures.

To Dr. L. O. Howard I am indebted for the loan of the U. S. National Museum material; Dr. J. C. Bradley has furnished a homogeneous lot of *Hydrometra martini* from the Cornell University Collection, as well as the type material for *H. myrae*; Mr. H. G. Barber has kindly loaned me his material; Mr. F. M. Gaige, of the University of Michigan, has furnished the Hubbell Honduras material; and Dr. H. M. Parshley his own collection in this group. The remainder of the specimens are from my own collection.

This extensive series of species and specimens has been of the greatest use in settling many of these species beyond doubt.

Many weak spots are discernible to me in this work. But so far as it goes and according to our present knowledge, it is my hope that it will prove useful to my fellow-workers. It will doubtless help them to set their own houses in order and to straighten out some of the difficulties indicated.

To the author, a work such as this makes keenly evident how much there is to know as to what really constitutes a species, and how frail is the basis of much work founded on the differentiation, relationship and origin of species. So many of these species seem to be regional; and, of course, arising from isolation. But how many more are there to be discovered? And how many of these here described will vanish through more exact knowledge?

Jacta est alea! Who shall recast it? And how? And to what purpose?

Finitum est opus!